

Data Supplement 1 Health Literacy Approach Form

Screener Name _____

Current Date _____ Time of Physician Approach _____

Physician approached: (circle one) Attending Resident

Physician's assessment of patient's health literacy: Adequate Marginal Inadequate

*****COMPLETE THIS SECTION ONLY IF PATIENT DECLINES TO PARTICIPATE*****

1. Time of patient approach: _____
 2. Age _____
 3. Gender (circle one) Male Female
 4. Ethnicity (circle one) White// Asian // Black // Hispanic // Other _____
 5. Reason for declining participation (OPTIONAL) :

-

*****COMPLETE THIS SECTION ONLY IF SUBJECT AGREES TO PARTICIPATE*****

Patient ID (MRN#) _____ Visit ID (Acct #) _____

Patient Last Name _____ Patient First Name _____

Description of Health Literacy Screening Instruments

Abbreviated Short Test of Functional Health Literacy in Adults (S-TOFHLA)

The S-TOFHLA was derived based on a convenience sampling of 211 urgent care patients at Grady Memorial Hospital in 1997 using the full TOFHLA as the criterion standard from which the weights of individual S-TOFHLA items were assessed using linear regression.¹ The internal consistency of the S-TOFHLA was then assessed with Cronbach's alpha, and to further examine validity, the S-TOFHLA was correlated with the Rapid Estimate of Adult Literacy in Medicine (REALM) using Spearman correlation coefficients.^{2,3} The S-TOFHLA demonstrated good internal consistency with Cronbach's alpha 0.68 for the four numeracy items and 0.97 for the reading comprehension score. The correlation between the S-TOFHLA and the REALM was 0.80, including 0.61 for the numeracy items and 0.81 for the reading comprehension items.⁴ The abbreviated S-TOFHLA is a timed test with a maximum of 7 minutes to complete the assessment. The instrument is based on two reading comprehension passages and uses a modified Cloze procedure in which every fifth to seventh word is removed and patients select the correct answer based on the surrounding context. The abbreviated S-TOFHLA is a copyright-protected instrument, which cannot be reproduced without permission, but sample questions are available at http://www.peppercornbooks.com/catalog/information.php?info_id=5. Scores range from 0-36 with results stratified into the categories of adequate (S-TOFHLA score >22), marginal (score 17-22), or inadequate (score 0-16).

Although the only published validation was of the full S-TOFHLA that incorporated both the numeracy and reading comprehension scores, the TOFHLA manual only uses the reading comprehension score.⁵ Accordingly, the version of S-TOFHLA that we used only tests the

reading comprehension, which is referred to as the abbreviated S-TOFHLA. The omitted numeracy section is comprised of four items that ask patients to do tasks such as read an appointment slip, and determine a schedule for taking a medication based on prescription information.⁴

Rapid Evaluation of Adult Literacy in Medicine (REALM)

The REALM is a word recognition test in which screeners score individual participants' ability to pronounce 66 common medical terms, body parts, and illnesses. It requires 3 to 5 minutes to complete. The REALM was derived based on a convenience sampling of 207 adults from one of six primary care clinics in Louisiana and Arkansas. To validate the REALM, the Slosson Oral Reading Test (SORT) and Peabody Individual Achievement Test-Revised (PIAT-R) were administered and compared using the Pearson correlation coefficient.^{6,7} The PIAT-R requires 40 minutes for a trained professional to administer and score. Multiple regression was used to determine the optimal cutoffs for the REALM compared with the PIAT-R. The REALM was significantly correlated with the SORT (0.95, $p < 0.001$) and the PIAT-R (0.94, $p < 0.001$).

The REALM was also reproducible with a test-retest reliability of 0.98, although the statistical method employed to assess reliability was not defined in the derivation manuscript.² The REALM was validated on a distinct population of 203 patients from four university hospital clinics as well as one hundred state prison inmates, using the PIAT-R, SORT, and Wide Range Achievement Test-Revised (WRAT-R), with correlations of 0.97, 0.96, and 0.88, respectively.^{3,8} Based on the construct validity of the REALM, investigators sought to derive a shorter screening instrument. They derived the REALM-R (Data Supplement 3) in 157 primarily white, well-educated adults in the internal medicine clinic at the University of Kentucky. The REALM-R

correlated with the WRAT-R with a Spearman rank correlation of 0.64. The Cronbach's alpha between the REALM-R and the WRAT-R was 0.91.⁹ The REALM-R asks participants to pronounce eight health-related words, and only requires 1 to 2 minutes to complete. The total score for the REALM-R is eight points, with anything less than six considered limited health literacy.

The Newest Vital Sign (NVS)

The NVS is based on a standardized nutritional label that is provided to patients to review before they answer questions that require interpretation of the label (Data Supplement 4). This six-item measure consists of information contained in a standard food nutrition label, and requires reading comprehension and numeracy skills. The NVS is available in both English and Spanish. The validity and sensitivity of this measure in detecting limited health literacy, compared with existing measures such as the REALM³ and the TOFHLA,¹ have been previously reported.^{10,11} Participants received NVS scores ranging from 0 to 6 based on the number of correct answers. Scores from 0 to 1 reflect a high likelihood of limited health literacy, 2 to 3 a possibility of limited health literacy, and 4 to 6 adequate health literacy.¹⁰ The NVS assesses document and numeracy skills, and requires about 3 minutes to administer. In the validation trial, the NVS was tested for internal validity using Cronbach's alpha against the TOFHLA and correlated with the same criterion standard using the Pearson correlation coefficient. In the derivation trials, subject recruitment occurred from three university affiliated primary care practices in Tucson, Arizona with 250 English-speaking and 250 Spanish-speaking paid participants. In English and in Spanish, the NVS had good internal consistency with Cronbach's alpha 0.76 and 0.69, respectively. The NVS was correlated with the TOFHLA with a correlation coefficient of 0.59

(English) and 0.49 (Spanish).¹⁰ The NVS has since been validated in separate outpatient clinic settings.¹¹

Single Item Literacy Screens (SILS)

The SILS were originally assessed in one Seattle Veterans Affairs pre-operative clinic using the S-TOHFLA as the criterion standard demonstrating an area under the receiver operating characteristic curve (AUC) of 0.87, 0.80, and 0.76, respectively.¹² The SILS were later validated via face-to-face interviews with 1,796 patients from four Veterans Affairs medical centers in Minneapolis MN, Los Angeles CA, Durham NC, and Portland OR using the S-TOFHLA and the REALM. The question “How confident are you filling out medical forms by yourself?” had the highest AUC of 0.74 for the S-TOFHLA, and 0.84 for the REALM.¹³

REFERENCES

1. Parker RM, Baker DW, Williams WV, Nurss JR. The test of functional health literacy in adults: a new instrument for measuring patients' literacy skills. *J Gen Intern Med* 1995;10(10):537-41.
2. Davis TC, Crouch MA, Long SW, et al. Rapid assessment of literacy levels of adult primary care patients. *Fam Med* 1991;23(6):433-5.
3. Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Fam Med* 1993;25(6):391-5.
4. Baker DW, Williams DM, Parker RM, Gazmararian JA, Nurss JR. Development of a brief test to measure functional health literacy. *Patient Educ Couns* 1999;38(1):33-42.
5. Nurss JR, Parker RM, Williams MV, Baker DW. TOFHLA: Test of Functional Health Literacy in Adults. Hartford MI: Peppercorn Books & Press Inc, 2001.
6. Slosson RL. Slosson Oral Reading Test (SORT). New York, NY: Slosson Educational Publications, Inc., 1963.
7. Dunn LM, Markwardt FC. Peabody Individual Achievement Test. Circle Pines, MN: American Guidance Service, 1970.
8. Jastak S, Wilkinson GS. Wide range achievement test-revised. Wilmington, DE: Jastak Associates, 1987.
9. Bass PF, Wilson JF, Griffith CH. A shortened instrument for literacy screening. *J Gen Intern Med* 2003;18(12):1036-8.
10. Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: the newest vital sign. *Ann Fam Med* 2005;3(6):514-22.

11. Osborn CY, Weiss BD, Davis TC, et al. Measuring adult literacy in health care: performance of the newest vital sign. *Am J Health Behav* 2007;31(Suppl 1):S36-46.
12. Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. *Fam Med* 2004;36(8):588-94.
13. Chew LD, Griffin JM, Partin MR, et al. Validation of screening questions for limited health literacy in a large VA outpatient population. *J Gen Intern Med* 2008;23(5):561-6.

Description of the Test

The REALM-R is a brief screening instrument used to assess an adult patient's ability to read common medical words. It is designed to assist medical professionals in identifying patients at risk for poor literacy skills. The REALM-R is a **word recognition** test – not a reading comprehension instrument. Adults are asked to de-code or pronounce words. The test takes less than 2 minutes to administer and score.

Preliminary data regarding the REALM-R has been published in the *Journal of General Internal Medicine* December 2003; 18:1036-1038.

Administration and Scoring:

1. Give the patient the laminated copy of the REALM-R word list. Attach the examiner record form to the clipboard. Hold the clipboard at an angle such that the patient is not distracted by your scoring procedure.

In your own words, introduce the REALM-R to the patient:

In a research setting or for research purposes:

"It would be helpful for us to get an idea of what medical words you are familiar with. What I need you to do is look at this list of words, beginning here [point to first word with pencil] . Say all of the words you know. If you come to a word you don't know, you can sound it out or just skip it and go on."

If the patient stops, say, "Look down this list [point] and say the other words you know."

In a clinical setting:

"Sometimes in this office, we may use medical words that patients aren't familiar with. We would like you to take a look at this list of words to help us get an idea of what medical words you are familiar with. It will help us know what kinds of patient education to give you. Start with the first word [point to 1st word with pencil], please say all of the words you know. If you come to a word you do not know, you can sound it out or just skip it and go on." If patient stops do as above.

****Special Note:** Do not use the words "read" and "test" when introducing and administering the REALM-R. These words may make patients feel uncomfortable and unwilling to participate.

"Please say these words for me?"

2. If the patient takes more than 5 seconds on a word, encourage the patient to move along by saying,

“Let’s try the next word.”

If the patient begins to miss every word or appears to be struggling or frustrated, tell the patient,

“Just look down the list and say the words you know.”

3. Count as an error any word that is not attempted or mispronounced (see “Special Considerations” for pronunciation/scoring guidelines).

4. Scoring options:

1) Place a check mark on the line next to each word the patient pronounces correctly.

OR

2) Place an X on the line next to each word the patient does not attempt or mispronounces.

Scoring should be strict, but take into consideration any problems which could be related to dialect or articulation difficulties. Use the dictionary if in doubt. Count as correct any self-corrected word. ***In our study we chose to define ‘at risk patients’ as those with a score of six or less.***

Special Considerations for Administration and Scoring:

Examiner Sensitivity:

Many low literate patients will attempt to hide their deficiency. Ensure that you approach each patient with respect and compassion. You may need to provide encouragement and reassurance.

A positive, respectful attitude is essential for all examiners. (Remember, many people with low literacy feel ashamed.) Be sensitive.

Visual Acuity:

If the patient wears glasses, ask him/her to put them on for this test. The REALM-R is designed to be read by persons with 20/100 vision or better. For vision of 20/100 or better I have used a font size of 18. In my studies we have excluded patients with worse vision. The REALM has a visually impaired version using a font size of 28.

Pronunciation:

Dictionary pronunciation is the scoring standard.

Dialect, Accent or Articulation Problems:

Count a word as correct if the word is pronounced correctly and no additions or deletions have been made to the beginning or ending of the word. For example: A patient who says “jaundiced” would not receive credit for the word “jaundice”; “directs” would not receive credit for the word “directed”; “colon” would not receive credit for “colitis”. Words pronounced with a dialect or accent should be counted as correct provided there are no additions or deletions to the word. Particular attention should be paid for patients who use English as a second language.

REALM-R Examiner Record

Patient Name/
Subject # _____ Date of Birth _____

Reading Level _____
Grade Completed _____

Date _____ Clinic _____ Examiner _____

fat	fatigue	_____
flu	directed	_____
pill	colitis	_____
allergic	constipation	_____
jaundice	osteoporosis	_____
anemia		

Fat, Flu, and Pill are not scored. We have previously used a score of 6 or less to identify patients at risk for poor literacy.

Score_____

fat

flu

pill

allergic

jaundice

anemia

fatigue

directed

colitis

constipation

osteoporosis

The Newest Vital Sign

		ANSWER CORRECT?	
		YES	NO
READ TO SUBJECT: This information is on the back of a container of a pint of ice cream.			
QUESTIONS			
1. If you eat the entire container, how many calories will you eat?			
Answer	☐ 1,000 is the only correct answer	_____	_____
2. If you are allowed to eat 60 g of carbohydrates as a snack, how much ice cream could you have?			
Answer	Any of the following is correct:	_____	_____
	☐ 1 cup (or any amount up to 1 cup)		
	☐ Half the container		
	Note: If patient answers "2 servings," ask "How much ice cream would that be if you were to measure it into a bowl?"		
3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes 1 serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?			
Answer	33 is the only correct answer	_____	_____
4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?			
Answer	10% is the only correct answer	_____	_____
Pretend that you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.			
5. Is it safe for you to eat this ice cream?			
Answer	☐ No	_____	_____
6. (Ask only if the patient responds "no" to question 5): Why not?			
Answer	Because it has peanut oil.	_____	_____
Total Correct		_____	_____

Data Supplement 5. Contingency (2x2) Tables for Health Literacy Screening Instruments

	S-TOFHLA \leq 22	S-TOFHLA $>$ 22
NVS, n=428		
Abnormal (≤ 3)	100	177
Normal (> 3)	2	149
REALM-R, n=433		
Abnormal (≤ 6)	84	126
Normal (> 6)	20	203
Numeracy score, n=435		
Abnormal (≤ 1)	84	166
Normal (> 1)	20	165
Summed SILS, n=433		
Abnormal (≤ 12)	70	81
Normal (> 12)	33	249
Help reading, n=433		
Abnormal (≤ 3)	44	48
Normal (> 3)	59	282
Medical forms, n=435		
Abnormal (≤ 3)	57	65
Normal (> 3)	47	266
Ability to read, n=435		
Abnormal (≤ 3)	42	15
Normal (> 3)	62	316
Physician gestalt, n=309		
Inadequate or marginal	39	69
Adequate	35	166

S-TOFHLA = Short Test of Functional Health Literacy in Adults; REALM-R = Rapid Estimate of Adult Literacy in Medicine-Revised; NVS = Newest Vital Sign; SILS = Single Item Literacy Screens